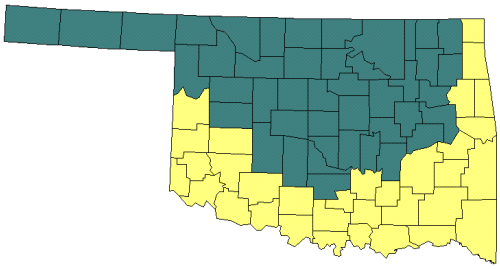
Identification and Evaluation of Fluvial-Dominated Deltaic Reservoirs -- Class I

University of Oklahoma



Geologic Plays: Morrow, Booch, Statewide

Layton-Osage Layton, Skinner and Pru,

Red Fork, Tonkawa, Cleveland and Peru,

Bartlesville Oklahoma

Pennsylvanian Age

DE-FC22-93BC14956

Contract Period:
1/15/1993 to 12/31/1997

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Objective: The Oklahoma Geological Survey, with the Geo Information Systems department and the School of Petroleum and Geological Engineering at the University of Oklahoma, will conduct a comprehensive collection and multi-disciplinary evaluation of information on Oklahoma fluvial-dominated deltaic oil reservoirs to identify conventional recovery technologies that have been (or could be) applied with commercial success. The project has implemented a technology transfer program targeted for the operators of studied reservoirs.

Technologies Used: The OGS Computer Facility is equipped with PCs, CD-ROM readers, an inkjet plotter, a laser printer, and scanning equipment. Geologic and engineering software, such as Geographix, ArcView, Rockworks, Toolkit, various reservoir and production simulators and models, and programs for pump optimization, log analysis and fracture analysis, are available for public use.

Background: This project is conducting a comprehensive collection and multi-disciplinary evaluation of information on Oklahoma fluvial-dominated deltaic oil reservoirs to identify conventional recovery technologies that have been (or could be) applied with commercial success. While a wealth of experience and knowledge exists regarding these technologies and reservoirs, much of it is in a form which is inaccessible or inconvenient to those who could benefit most from it: the operators of FDD reservoirs. This is the first such comprehensive statewide program of study addressing a specific geologically defined reservoir group.

Incremental Production: Not applicable

Expected Benefits and Applications: Light oil production from Class I reservoirs is a major component of Oklahoma's crude oil production. Nearly 1,000 fluvial-dominated deltaic (FDD) reservoirs provide an estimated 15% of the state's crude oil production. Most Class I reservoir production in Oklahoma is by small companies and independent operators who commonly do not have ready access to the information and technology required to maximize exploitation of these reservoirs. Thus, production from Class I reservoirs in Oklahoma is at high risk because individual well production is low (1-3 barrels per day) and operating costs are high. Without positive intervention, most of the production from Oklahoma Class I reservoirs will be abandoned early in the next century. This is the first such comprehensive statewide program of study addressing a specific geologically defined reservoir group.

Accomplishments: The response to this program from the Oklahoma industry has been very positive, with numerous attendees returning to attend multiple workshops. There is strong support from industry for the Survey to continue the 'play-based' workshop and publication series for other depositional environments once this FDD program is completed. The publication and workshop materials for each play include an overview of FDD depositional environments, a regional overview of each play, and field studies of selected reservoirs. All of the information collected from each of the plays is being included in a digital format in the OGS Computer Facility. Also included in the computer facility is the Natural Resources Information System (NRIS), a set of digital data files on petroleum information in Oklahoma. The Oklahoma Geological Survey (OGS), in cooperation with Geo Information Systems and the School of Petroleum and Geological Engineering of the University of Oklahoma, has completed the investigation of fluvial-dominated deltaic light-oil reservoirs in Oklahoma. The study produced the identification of 10 plays that were incorporated into 8 publications: Morrow Play, Booch Play, Layton and Osage-Layton Play, Skinner and Prue Plays, Cleveland and Peru Plays, Red Fork Play, Tonkawa Play, and Bartlesville Play. A total of 14 workshops were presented on these plays with a total attendance of 1,200 operators and other interested parties at these workshops. Responses to each of the workshops were uniformly high with most attendees indicated that this was the best thing ever done for them. The 8 publications produced through this program are among the all time best sellers for the Oklahoma Geological Survey. Complementary copies of the publications were made available to operators within these plays who were not able to attend the workshops. Play publications were produced as Oklahoma Geological Survey Special Publications, and are available for the Oklahoma Geological Survey.

Because of this strong response and requests from those who were unable to attend these workshops when they were scheduled, an agreement has been reached with the Oklahoma City Geological Society (OCGS) to present jointly each of the workshops again in a one-half day format. The first of the workshops repeated the Tonkawa Play to be presented on March 31, 1998 at the Home Builders Association Building in Oklahoma City. The OCGS or the OGS may be contacted for more details. The remaining workshops will be presented on a periodic basis to be determined in the near future. Because of the strong interest shown by operators and other interested parties in play-based workshops, the Oklahoma Geological Survey decided to continue the program with in-house resources and has begun work on the development of the Hartshorne Play. This

play will include the development of coal-bed methane in the Hartshorne Coal. Presentations of this information were made on September 30, 1998 at the Francis-Tuttle VoTech in Oklahoma City and again at the Indian Area VoTech in Muskogee on November 4, 1998. A novel concept added to this workshop is an optional two-day field trip that examined outcrops of various Hartshorne depositional environments that produce hydrocarbons in the subsurface in adjacent areas. The field trip was held November 11-12, 1998.

Publications: The following eight publications have been produced through this program: (1) OGS SP 95-1 "Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Morrow Play." (2) OGS SP 95-3 "Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Booch Play." (3) OGS SP 96-1 "Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Layton and Osage-Layton Play." (4) OGS SP 96-2 "Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Skinner and Pru Plays". (5) OGS SP 97-1 "Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Red Fork Play". (6) OGS SP 97-3 "'Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Tonkawa Play". (7) OGS SP 97-5, "Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Cleveland and Peru Plays". (8) OGS SP 97-6, "Fluvial-Dominated Deltaic (FDD) Oil Reservoirs in Oklahoma: The Bartlesville Play". (9) Banken, M. K, 1998, “Identification and Evaluation of Fluvial-Dominated Deltaic (Class I Oil) Reservoirs in Oklahoma”: Final Report, Oklahoma Geological Survey, University of Oklahoma, Norman, Oklahoma; November 1998, DOE/BC/14956-16 (DE98000547).

Recent/Upcoming Technology Transfer Events: Project Homepage
http://www.ou.edu/special/ogs-pttc
(1) Jock A. Campbell, “FDD Reservoir Systems in Oklahoma: the Osage-Layton field study”,
Tulsa Geological Society, February 23, 1999. (2) Jock A. Campbell, “Major Pennsylvanian Fluvial-Deltaic Light Oil Reservoir Systems in Oklahoma”, Oklahoma Geological Survey; DOE Oil and Gas Conference, June 28-30, 1999, Dallas Texas.

Project Status: Project completed. Final report published November 1998.